ratio $\Delta p/\frac{1}{2}\rho v^2$ was found to average 0.207, with individual values showing a maximum variation of 7 percent and a mean variation of 3 percent from the average.

Measurements were made at angles of yaw up to 60° with the results given in the table below, the application of which is obvious from the basic relation:

$\Delta p = kv_s^2$, where

Δp = dynamic pressure deficiency in *mm of mercury*.

v_s = "standard" (or indicated) airspeed, in *miles per hour* (referred to standard density of 0.07651 lbs./ft.^{3}).

k = constant for a given angle of yaw.

TABLE 1

Angle of yaw	k
0°	0.000190
5°	.000204
10°	.000242
15°	.000267
20°	.000353
25°	.000386
30°	.000399
45°	.000435
60°	.000407

From this it is easy to compute, for example, that at 5° yaw the absolute pressure given by the instrument at an indicated air speed of 100 miles per hour is 2 mm lower than the true static pressure.

Several attempts were made to reduce the error in question. The most promising result was secured by the use of flaps or scoops over the side holes to increase the pressure in the space at the rear of the instrument. The flaps were made by cementing flat strips of metal about ¾ inch wide and about 7¾ inches long, bent at an angle of approximately 45°, behind the side ventilation holes. At 0° angle of yaw, with the flaps, k was found to be 0.000017, and at 15°, k was 0.000094. With this arrangement, the effect is less than 0.3 mm at 100 miles per hour for small angles of yaw.

The use of flaps greatly increases the ventilation of the temperature and humidity elements, whence the question arises as to the possible effect of the strong air currents on the indications of these elements. Tests made to determine this effect were inconclusive because of the vibration of the tunnel and the slow speed of the drum. However, the effect was not very large and possibly may be avoided by the use of baffle plates to direct the air currents within the instrument.

Acknowledgement is made to Dr. H. L. Dryden and his associates of the Bureau of Standards for their kind cooperation and for making the wind tunnel measurements and experiments as well as the necessary calculations.

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ANALYSIS OF THE PRECIPITATION OF RAINS AND SNOWS AT MOUNT VERNON, IOWA

By S. FRANCIS WILLIAMS and O. KENNETH BEDDOW

[Cornell College, Mount Vernon, Iowa, June 1932]

Under the direction of Dr. Nicholas Knight, Cornell College, Mount Vernon, Iowa, has for the last 24 years carried on an analysis of the rain and snow precipitated here. The results of much of this work have been published in periodicals of a scientific nature.

The precipitations are collected in clean granite pans, away from trees and buildings, and stored in glass stoppered bottles. The town has no factories and, exclusive of the college, has a population of about 1,700. The sulphuric acid found, therefore, comes mainly from the coal used in private heating plants. It is worthy of note this year there has been a lack of sulphuric acid. We have never found so little sulphuric acid in the rains as we found the past winter. This may be due to the depression. The coal burned in heating plants contains sulphur which in burning becomes sulphuric acid in the atmosphere. The poor people burned wood which was furnished them, or by cutting it, they could obtain their fuel very cheaply. One of the local coal dealers claims he has sold no coal to the people living in the country. Hence the depression affected the atmosphere and consequently the precipitations.

It has been found necessary to deduct 3.55 parts per million from the reading to allow for the formation of the color in the test for the chlorides. Six drops of the potassium dichromate indicator were used. Due to some criticism special care has been taken in the analysis of the chlorides, which, after considerable work, we have reason to believe correct. The phenoldisulphonic acid method was used with the nitrates. All of the samples were colorless.

The method used in the analysis are taken from the Standard Methods of Water Analysis, sixth edition, published by the American Health Association.

The results of the school year 1931–32 are expressed in tables 1 and 2. The numbers indicate the parts of the various substances in a million parts of water. We examined 48 samples of rains and snows.

TABLE 1.—*Parts per million*

No.	Date	Amount	Precipitation	Nitrates	Nitrites	Free NH_3	Alb. NH_3	SO_4	Cl
1	June 12	0.1	Rain			0.08	0.04		7.15
2	Sept. 19	1.2	do	0.03	.002	.112	.04		7.15
3	Sept. 22	1.9	do	.01	Traces	.08	.056		3.6
4	Sept. 23	.5	do	1.00	.014	.08	.056		3.6
5	Sept. 25	2.25	do	.02	.032	.112	.04		3.6
6	Oct. 4	.2	do	.01	.01	.24	.056		3.6
7	Oct. 6	.25	do	.01	.032	.24	.08		3.6
8	Oct. 7	.3	do	.01	.002	.32	.16		3.6
9	Oct. 10	2.5	do	.01	.002	.32	.04		10.7
10	Oct. 14	.5	do	.01	.024	.16	.08		3.6
11	Oct. 23	1.1	do	.01	.04	.16	.16		3.6
12	Oct. 27	.55	do	Traces	.036	.32	.04		10.7
13	Oct. 31	.3	do	Traces	.04	.112	.112		10.7
14	Nov. 10	.1	do	.02	.036				10.7
15	Nov. 12	1.	do	.036		.04	.08		10.65
16	Nov. 15	1.	do	.04	.5	.056	.28	0.044	3.6
17	Nov. 17	1.25	do	.21		.056	.16		3.6
18	Nov. 20	.5	do	.03	.5	.08	.04		10.65
19	Nov. 23	1.5	do	.036	.25	.056	.04		7.15
20	Nov. 27	.25	do	.036	.5	.08	.056		7.15
21	Dec. 9	4.	Snow	.36	Traces	.2	.136	.428	3.6
22	Dec. 11	.3	Rain	.12	.05	.08	.056	.324	3.6
23	Dec. 14	1.	Snow	.01		.16	.24	.146	10.7
24	Dec. 31	1.15	Rain	.01	.05	.08	.04	.168	7.
25	Jan. 6	.5	do	.01	.025	.24	.136	.134	7.
26	Jan. 13	.25	do	.24	.05	.32	.2	.184	7.
27	Jan. 15	.3	Rain and snow	.1	.05	.112	.056	.068	7.
28	Jan. 16	.25	Rain	.08	.05	.116	.056	1.68	7.
29	Jan. 26	2.	Rain and snow	.12	.5	.16	.2	1.7	7.
30	Feb. 16	.25	Rain	.01	.05	.08	.04		10.7
31	Mar. 2	.6	do	.030	Traces	.056	.112		10.7
32	Mar. 5	.6	Snow	.02	.05	.16	.056		7.15
33	Mar. 19	.4	Rain and snow	.01	.05	.32	.2		10.7
34	Mar. 21	.9	Snow	.01	.05	.16	.056		10.7
35	Mar. 26	.15	Rain	.01		.16	.056		3.6
36	Mar. 31	.08	do	.03	.03				17.5
37	Apr. 7	.08	do	.07	.01	.136	.056		10.7
38	Apr. 16	.35	do	.02	.05	.2	.32	Traces	3.6
39	Apr. 19	.4	do	.02	.05	.056	.112	Traces	7.2
40	Apr. 20	.15	do	.03	.05	.32	.2	Traces	7.15
41	Apr. 24	.4	do	.01	.04	.32	.36	Traces	7.15
42	Apr. 30	.2	do	.01	Traces	.08	.04		10.7
43	May 3	.7	do	.01	Traces	.114	.056		10.7
44	May 7	.7	do	Traces	Traces	.24	.136		15.25
45	May 16	.5	do	.01	Traces	.16	.056		3.6
46	June 3	1.05	do	.01	.03	.112	.2		7.2
47	June 4	.3	do	.01	.01	.32	.04		3.6
48	June 8	.3	do	.01	.05	.2	.136		3.6

TABLE 2.—*Data from table 1 converted to pounds per acre*

[1 inch of rain over 1 acre=226,875 pounds]

No. of sample	Nitrates	Nitrites	Free NH_3	Alb. NH_3	Sulphur	Chlorides
1			0.001815	0.000907		0.162215
2	0.00816	0.00054	.030492	.01089		1.9464
3	.004310		.034485	.024139		1.551825
4	.113437	.001381	.009075	.006352		.408375
5	.010209	.016350	.057172	.020418		2.53768
6	.000453	.000453	.010890	.002541		1.6335
7	.000567	.001814	.013612	.004537		.204184
8	.000680	.000136	.021780	.010890		.245025
9	.005671	.001134	.118499	.022687		6.06890
10	.001343	.002722	.018150	.009075		.408375
11	.002495	.009982	.039920	.039920		.888416
12		.004492	.039920	.004991		1.335159
13		.002722	.007623	.007623		.728268
14	.004530	.000816				.242756
15	.068468		.009075	.018150		2.416218
16	.009075	.133437	.012705	.063525	.01108	.816750
17	.059554		.015881	.045374		1.020934
18	.003403	.056718	.009074	.004537		1.208064
19	.012251	.085078	.019057	.013612		2.433000
20	.020418	.028359	.004537	.003176		.405500
21	.026952		.014973	.010182	.03204	.269524
22	.008167	.003403	.005444	.003811	.02205	.245023
23	.000181		.002904	.004356	.02649	.194205
24	.002609	.013045	.020872	.010436	.04383	1.82364
25	.001134	.002835	.027224	.015427	.01520	.794059
26	.013684	.002850	.018245	.011403	.010491	.399126
27	.006806	.003403	.007622	.038114	.004628	.476434
28	.004537	.002835	.006579	.003176	.095386	.397026
29	.063350	.226875	.072600	.907500	.771375	.247625
30	.000567	.002935	.004537	.002268		.606882
31	.004083		.007623	.015246		1.456537
32	.000226	.000567	.001814	.000635		.081102
33	.000907	.004537	.029040	.018150		.971025
34	.000158	.000794	.002540	.000889		.169986
35	.000340		.005444	.001905		.122511
36	.005445	.005445				.317625
37	.001270	.000181	.002464	.001016		.194205
38	.001588	.003970	.015881	.025409		.286861
39	.001815	.004537	.005082	.010164		.653400
40	.001020	.001701	.010889	.006806		.243321
41	.000907	.003630	.029040	.032670		.648863
42	.000453		.003627	.001814		.485311
43	.001588		.018104	.008893		1.699288
44			.037114	.021589		2.421883
45	.001134		.018149	.006352		.408373
46	.002382	.007146	.026680	.047643		1.714169
47	.000680	.000680	.021780	.002722		.245023
48	.000680	.003403	.013612	.009256		.245023

PLAN FOR DIRECT CALL TO SHIPS BY RADIO FOR WEATHER REPORTS DURING HURRICANE SEASON

[Bulletin issued by the Forecast Division, Weather Bureau, Washington, June 1, 1933]

When a tropical disturbance is in progress in the southern portion of the North Atlantic, the Gulf of Mexico, or the Caribbean Sea, ship reports of weather conditions by radio are frequently lacking from the areas in which the disturbance is located, even though some ships may be traversing the area. The present program provides weather reports twice daily throughout the hurricane season from a number of ships known to traverse the hurricane districts more or less regularly. This list of ships is now about as extensive as available appropriations will permit for daily service. Prefixed arrangements with other ships for securing additional or special observations when a storm is known to be in progress are not practicable; nevertheless, some additional observations are secured during such conditions by adding to weather bulletins broadcast for the benefit of ships a request for special reports from any ship within a specified area and by general notices included in navigation publications asking masters to radio weather reports on their own initiative, when a tropical disturbance is encountered or known to exist in the vicinity. Direct acknowledgment by letter is made to shipmasters who forward special observations.

During the coming hurricane season the arrangements described in the foregoing will be supplemented by publication of appeals in the Hydrographic Bulletin and other publications of the United States Hydrographic Office.

Notwithstanding the foregoing arrangements, it is known that in past instances, when reports were badly needed, ships, (principally those making occasional visits to ports in the hurricane area, and those not on regularly scheduled routes, with which it was impracticable to make prior arrangements for daily reports) were in the vicinity of a disturbance but sent no reports.

In order to assure the receipt of the maximum number of reports, a new and supplemental plan will be inaugurated at the beginning of the 1933 hurricane season. This additional program provides for direct calls for observations by radiogram to ships in certain zones in which a tropical storm is known or suspected to exist. Certain shore radio stations which are capable of communicating with vessels in the respective zones will be utilized as the medium through which the radiograms will be transmitted.

The Radiomarine Corporation of America has offered cooperation and will make its radio stations available. The locations, call signals, and ranges of the radio stations of that company, which will participate in the program, and the contacting weather stations, are as follows: